_PInternational Research Journal of Pharmaceutical and Applied Sciences (IRJPAS)
Available online at **www.irjpas.com**
Int. Res J Pharm. App Sci., 2014;4(1):1-3

Research Article

ANTIDIABETIC ACTIVITY OF METHONOLIC EXTRACT OF IN STREPTOZOTOCIN INDUCED DIABETIC RATS *HIBISCUS DEFLERSII*

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Abstract: The aim of present study was to evaluate antidiabetic activity of methanolic extract of *Hibiscus deflersii* (family Malvaceae) leaves in streptozotocin induced diabetic rats. The alcoholic extract of *Hibiscus deflersii* was studied for antidiabetic activity in streptozotocin induced diabetic rats by oral administration of extract 400mg/kg body weight for 15 days. The effect was compared with oral dose of 0.5mg/kg Glibenclamide. The determination of blood glucose level by GOD-POD kit method. The result shows the alcoholic extract of *Hibiscus deflersii* leaves significantly lowered the blood glucose of hyperglycemic rats. From the toxicity study it was observed that methanolic extract of *Hibiscus deflersii* was nontoxic up to 5g/kg body weight and phytochemical study showed the presence of phytosterols, flavonoids and glycosides. It is concluded that *Hibiscus deflersii* leaf extract has significant antidiabetic activity, which lowered the fasting blood glucose level in Streptozotocin induced diabetic rats.
Key words: antidiabetic activity, *Hibiscus deflersii*, streptozotocin induced diabetic rats, blood glucose level

INTRODUCTION

Diabetes mellitus is a serious complex chronic condition that is a major source of ill health worldwide. Diabetes can be divided into twot ypesbased on their requirements for insulin·Type 1 : Insulin- dependent diabetes mellitus [IDDM]·Type 2 : Non- insulin dependent diabetes [NIDDM]Type 1: Insulin dependent diabetes mellitus [IDDM]. A burst of insulin secretion normally occurs after ingestion of a meal in response to transient increase in the levels of circulating glucose and amino acids. in the post operative period, low, basal levels of circulating insulin are maintained through beta cell secretion. However type one diabetic has virtually no functional beta cells.Treatment: Type 1 diabetic must rely on exogenous (injected) insulin in order to control hyperglycemia, maintain acceptable levels of glycosylated hemoglobin (HbA1C) and avoid ketoacidosis. The goal in administering insulin to type 1 diabetic is to maintain blood glucose concentrations as close to normal as possible and to avoid wide swings in blood glucose levels that may contribute to long-term complications. Type 2 : Non- insulin dependent diabetes mellitus [NIDDM].[1-2]

According to WHO projections, the prevalence of diabetes is likely to increase by 35%. Currently, there are over 150 million diabetic patients worldwide and this is likely to increase to 300 million or more by the year 2025. Statistical projection about India suggests that the number of diabetics will rise from 15 million in 1995 to 57 million in the year 2025, the highest number of diabetics in the world[3]. Reasons for this rise include increase in sedentary lifestyle, consumption of energy-rich diet, obesity, higher life span, etc. Other regions with greatest number of diabetics are Asia and Africa, where diabetes mellitus rates could rise to twofold to threefold than the present rates[3].

Evaluation of plant products to treat diabetes mellitus is of growing interest as they contain many bioactive substances with therapeutic potential. In recent years, several authors evaluated and identified the antidiabetic potential of traditionally used Indian medicinal plants using experimental animals. Previous studies confirmed the efficacy of several medicinal plants in diabetes mellitus [4-6]. Although a large number of medicinal plants have been already tested for their antidiabetic effects, these effects remain to be investigated in several other Indian medicinal plants.

Hibiscus deflersii (Malvaceae) is an annual or perennial herbaceous bush and has several forms with varying colors of flowers. It is native to Ethiopia and grown widely as an ornamental plant The flowers are considered emollient, and an infusion of the petals is used as a demulcent. Its decotion is given in bronchial catarrh in India. Previous studies show that the plant possesses anticomplimentary, antidiarrhetic and antiphologistic activities. The leaves and flowers have been found to be effective in the treatment of heart disorders. No reports are available on the antidiabetic activity of *Hibiscus deflersii* leaves. Hence, the present study focuses on the scientific investigation of antidiabetic activity of *Hibiscus deflersii* leaves.[7-8]

MATERIALS AND METHODS

(i) Plant material

Fresh leaves were collected from tropical area in and authentified by K Rajesh Adigrat Univerisity Ethiopia

(ii) Extraction

The leaves, shade dried, Powdered in a grinder mixture to obtain coarse powder and then passed through 60 mesh sieve. The powdered leaves were extracted using continuous hot extraction method by gradient extraction technique. The extracts were evaporated to dryness and phytochemical screenings were performed

(iii) Animals

Swiss albino mice of female sex weighing 20-25gms were employed for toxicity study. Albino wistar rats of male sex weighing 200- 250 gms were employed for antidiabetic study. They were housed in standard environment condition and fed with standard rodent diet with water and ad libitum. Ethical clearance for the animal study was obtained from Institutional Animal Ethical Committee

(iv) Toxicity Study

An acute oral toxicity study was performed as per OECD guidelines 423. By Acute toxic class method Swiss albino mice of female sex weighing 20-25gms were used for the study. Acute toxic class method is a stepwise procedure with use of three animals of a single sex per step. Depending on mortality or morbidity status of the animals. Average 2-4 steps may be necessary to allow judgement on the acute toxicity of the substance. Three animals were used for each step. The animal were placed individually and observed for any sign of toxicity, morbidity or mortality during the first 24hrs, with special given attention during the first 4 hours and daily thereafter for a total of 14 days.

(v) Induction of diabetes [5-7]

All the rats were fasted overnight before the administration of Streptozotocin. Diabetes was induced in rats by intra peritoneal injection of streptozotocin dissolved in 0.1M sodium citrate buffer pH4.5 at the dose of 50mg/kg body weight. After the injection they had free access to food and water. The animals were allowed to drink 5% glucose solution overnight to overcome hypoglycaemic shock. The development of diabetes was confirmed after 48hrs of Streptozotocin injection. The animals having fasting blood glucose level more than 200mg/dl were considered as diabetic rats and used for the experimentation. Diabetic animals were grouped five days after induction of diabetes Effect of Methanolic Extract of *Hibiscus deflersii* in streptozotocin induced diabetes in rats.

Experimental Design

In the experiment rats were divided into the following groups with six animals each

Group I **:** Normal control received 1% w/v gum acacia 1ml/kg for 15 days orally.

Group II **:** Diabetic control received 1% w/v gum acacia 1ml/kg for 15 days orally.

Group III **:** Diabetic rats received methanolic extract of *Hibiscus deflersii* leaf 400mg/kg body weight once a day orally for 15 days.

Group IV **:** Diabetic rats treated with Glibenclamide 0.5mg/kg orally once a day for15 days. Rats were fasted overnight and the blood was withdrawn from the orbital sinus of the eye on the 5th day, 15th day and 20th day post induction to determine blood glucose by GOD-POD kit method. The change body weight was observed throughout treatment period in experimental animals.

Stastistical Analysis

All values were expressed as Mean ± S.D.

RESULTS

The preliminary phytochemical studies indicate the presence of phytosterols, Flavonoids and glycosides in methanolic extract *Hibiscus deflersii* leaf. In acute toxicity study the methanolic extract of *Hibiscus deflersii* did not produce lethality up to the dose level of 2000mg/kg

Table- 1: ***Effect of Hibiscus deflersii leaf extract on body weight in Streptozotocin induced diabetic Rates***

	Body weight in gms(Mean±SEM) Post induction days		
Groups	5th day	15th day	20th day
Control	167.2±3.15	173±3.24	181±3.24
Diabetic Control	163.8±3.32	136.8/±2.11	125.3±2.49
Diabetic rats+ Control	164.3±1.97	170.3±1.763	175.8±1.48
Diabetic rats+ glibenclamide	165.1±2.78	170.8±82.63	178.5±2.38

In the antidiabetic activity, the effects of *Hibiscus deflersii* leaf extract on body weight is measured on 5th, 15th and 20th day of post induction and were compared with normal and diabetic control groups. The values are shown in Table No-1.

DISCUSSION

In the present study the hypoglycemic activity of methanolic extract of *Hibiscus deflersii* leaves was evaluated in Streptozotocin induced diabetic rats. The continuous treatment of leaf extract for a period of 15 days produced a significant decrease in blood glucose level in diabetic rats which is comparable to that of standard drug Glibenclamide which is used in treatment of type II diabetes mellitus. The standard drug Glibenclamide stimulates insulin secretion from beta cells of islets of langerhans. From the study, it is suggested that the possible mechanism by which the plant extract decreases the blood glucose level may be by potentiation of insulin effect either by increase in pancreatic secretion of insulin from beta cells of islets of langerhans or by increase in peripheral glucose uptake.

CONCLUSION

The methanolic extract of *Hibiscus deflersii* leaf exhibited significant hypoglycemic activity in streptozotocin

induced diabetic rats. From the phytochemical analysis it was found that the major chemical constituents of the leaf extract were flavonoids and glycosides. On the basis of above evidence it is possible that the presence of flavonoids may be responsible for the observed antidiabetic activity. Further pharmacological and biochemical investigations are underway to find out the active constituents responsible for antidiabetic activity and to elucidate its mechanism of action.

ACKNOWLEDGEMENTS

The authors are thankful to K Rajesh Adigrat University Ethiopia for supply of the medicinal plant due acknowledgements to K M Subbu Rathinam A Ravi Kumar for helpful in the work and suggestions

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